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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/761,368	01/22/2004	Tsuyoshi Kaneko	118056	3418

25944 7590 02/03/2005

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EXAMINER	
CONNELLY CUSHWA, MICHELLE R	

ART UNIT	PAPER NUMBER
2874	

DATE MAILED: 02/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

H·A

Office Action Summary	Application No.	Applicant(s)	
	10/761,368	KANEKO, TSUYOSHI	
	Examiner	Art Unit	
	Michelle R. Connelly-Cushwa	2874	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-26_ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-26_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _22 January 2004_ is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _0104_.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

The prior art documents submitted by applicant in the Information Disclosure Statement filed on January 22, 2004 have all been considered and made of record (note the attached copy of form PTO-1449).

Drawings

Seven (7) sheets of formal drawings were filed on January 22, 2004 and have been accepted by the Examiner.

Specification

Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 2, 9, 16 and 17 are rejected under 35 U.S.C. 102(b) as being anticipated by Ladany (US 4,265,699).

Regarding claims 1, 2 and 9; Ladany discloses a lens-integrated optical fiber in Figure 3, comprising:

- an optical fiber (10) including a core (12) and a clad (14); and
- a lens (20) mounted on an end face (18) of the optical fiber (10);
- the lens (20) being formed so that the maximum width of the maximum cross section of the lens is greater than the maximum width of the end face of the optical fiber/core, wherein the maximum cross section is the cross section of the lens cut by a plane that is parallel with the end face of the optical fiber/core that makes the cross section area of the lens the greatest.

Regarding claims 16 and 17; Ladany discloses a method to produce a lens-integrated optical fiber, comprising:

- forming a lens precursor on the end face (18) of the optical fiber (10)/ core (12) by discharging a liquid drop (15) on the end face of the optical fiber/core, at an end of the optical fiber including the core (12) and a clad (14); and
- forming a lens by curing the precursor (see column 4, lines 10-14);
- the lens (20) being formed so that the maximum width of the maximum cross section of the lens is greater than the maximum width of the end face of the optical fiber/core, wherein the maximum cross section is the

cross section of the lens cut by a plane that is parallel with the end face of the optical fiber/core that makes the cross section area of the lens the greatest.

Claims 2-5, 9-11, 17-19, 22 and 23 are rejected under 35 U.S.C. 102(b) as being anticipated by Kashiwazaki (JP08-043678 A).

Regarding claim 2-5 and 9-11; Kashiwazaki discloses a lens-integrated optical fiber in Figures 1-4, comprising:

- an optical fiber including a core (13) and a clad (11); and
- a lens (16) mounted on an end face of the optical fiber;
- the end face (14) of the core (13) differing from an end face (12) of the clad in height at the end of the optical fiber;
- the core being uncladded at an end of the optical fiber (there is no cladding formed on the end face, 14, of the core at the end of the optical fiber);
- the core (13) and the clad (11) forming a protrusion at an end of the optical fiber (the core is recessed so that the clad forms a protrusion);
- the core and the clad forming a recess at the end of the optical fiber (the core is recessed); and
- the lens (16) is formed so that the maximum width of the maximum cross section of the lens is greater than the maximum width of the end face of the core, wherein the maximum cross section is the cross

section of the lens cut by a plane that is parallel with the end face of the core that makes the cross section area of the lens the greatest.

Regarding claims 17-19, 22 and 23; Kashiwazaki discloses a method to produce a lens-integrated optical fiber, comprising the steps of:

- forming the end of the optical fiber so that the end face (14) of the core (13) differs in height from the end face (12) of the clad;
- removing the clad around the core at the end of the optical fiber (see Figure 1(b));
- removing the core adjacent to the clad at the end of the optical fiber;
- forming a lens precursor (curing resin, 15) on the end face (14) of the core (13) by discharging a liquid drop (15) on the end face of the core, at an end of the optical fiber including the core (13) and a clad (11); and
- forming a lens by curing the precursor (see the abstract);
- the lens (16) being formed so that the maximum width of the maximum cross section of the lens is greater than the maximum width of the end face of the core, wherein the maximum cross section is the cross section of the lens cut by a plane that is parallel with the end face of the core that makes the cross section area of the lens the greatest.

Claims 1-5, 7, 9, 10 and 16-22 are rejected under 35 U.S.C. 102(b) as being anticipated by Nakamura (JP 02-277006).

Regarding claims 1-5, 7, 9 and 10; Nakamura discloses a lens-integrated optical fiber in Figure 1, comprising:

- an optical fiber including a core (6) and a clad (7); and
- a lens (20) mounted/formed on the end face of an optical fiber /core (the end face of the optical fiber is the end face of the core, 6);
- the lens being formed so that the maximum width of the maximum cross section of the lens is greater than the maximum width of the end face of the optical fiber/core, wherein the maximum cross section of the lens is the cross section cut by a plane that is parallel with an end face of the optical fiber/core and that makes the cross sectional area of the lens greatest;
- wherein the end face of the core (6) differs from the end face of the clad (7) at the end of the optical fiber;
- wherein the core (6) is uncladded at the end of the optical fiber;
- wherein the core and the clad form a protrusion at the end of the optical fiber (the cladding being stripped from the end so that the core protrudes); and
- wherein the surrounding of the core is covered with a sealing agent (adhesive or solder to fix the optical fiber to the optical fiber holder, 13; see the abstract) at the end of the optical fiber.

Regarding claims 16-22; Nakamura discloses a method to produce a lens-integrated optical fiber (see Figure 1 and Figure 3), comprising:

- forming the end of the optical fiber so that the end face of the core (6) differs from the end face of the clad (7);
- removing the clad (7) around the core (6) at the end of the optical fiber;
- extending the core (6) at the end of the optical fiber;
- covering a surrounding of the core with a sealing agent (adhesive or solder to fix the optical fiber to the optical fiber holder, 13; see the abstract);
- forming a lens precursor on the end face of the optical fiber/ core (6; the end face of the optical fiber is the end face of the core) by discharging a liquid drop (21) on the end face of the optical fiber/core, at an end of the optical fiber including the core (6) and a clad (7); and
- forming a lens by curing the precursor (see the abstract);
- the lens (20) being formed so that the maximum width of the maximum cross section of the lens is greater than the maximum width of the end face of the optical fiber/core, wherein the maximum cross section is the cross section of the lens cut by a plane that is parallel with the end face of the optical fiber/core that makes the cross section area of the lens the greatest.

Claims 1, 2, 9, 16, 17 and 24 are rejected under 35 U.S.C. 102(b) as being anticipated by Cox et al. (US 2001/0033712 A1).

Regarding claims 1, 2 and 9; Ladany discloses a lens-integrated optical fiber in Figure 3, comprising:

- an optical fiber (10) including a core (12) and a clad (14); and
- a lens (20) mounted on an end face (18) of the optical fiber (10);
- the lens (20) being formed so that the maximum width of the maximum cross section of the lens is greater than the maximum width of the end face of the optical fiber/core, wherein the maximum cross section is the cross section of the lens cut by a plane that is parallel with the end face of the core that makes the cross section area of the lens the greatest.

Regarding claims 16 and 17; Figures 1 and 2A-2D of Cox et al. disclose a method to produce a lens-integrated optical fiber, comprising:

- forming a lens (22) precursor on the end face (18) of the optical fiber (10)/ core (16) by discharging a liquid drop (41) on the end face of the optical fiber/core, at an end of the optical fiber including the core (16) and a clad (14); and
- forming a lens by curing the precursor (see paragraph [0028]);
- the lens (22) being formed so that the maximum width of the maximum cross section of the lens is greater than the maximum width of the end face of the optical fiber/core, wherein the maximum cross section is the cross section of the lens cut by a plane that is parallel with the end face of the optical fiber/core that makes the cross section area of the lens the greatest.

Regarding claim 24; an inkjet method is used to discharge the liquid drop from ink-jet printhead (36).

Claims 1, 2 and 9 are rejected under 35 U.S.C. 102(e) as being anticipated by Kroupenkine (US 6,674,940 B2).

Regarding claims 1, 2 and 9; Kroupenkine discloses a lens-integrated optical fiber (1) in Figure 1, comprising:

- an optical fiber (1) including a core (5) and a clad (3); and
- a lens (7) mounted/formed on the end face (9) of an optical fiber (1)/core (5);
- the lens being formed so that the maximum width of the maximum cross section of the lens is greater than the maximum width of the end face of the optical fiber/core, wherein the maximum cross section of the lens is the cross section cut by a plane that is parallel with an end face of the optical fiber/core and that makes the cross sectional area of the lens greatest.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kashiwazaki (JP 08-043678).

Regarding claim 6; Kashiwazaki discloses all of the limitations of claim 6, except for the refractive index of the lens being substantially equal to a refractive index of the core. One of ordinary skill in the art would have found it obvious to have the refractive index of the lens be substantially equal to the refractive index of the core in the invention of Kashiwazaki in order to minimize the amount of light that is scattered or lost at the interface of the core and the lens.

Claims 6 and 8 rejected under 35 U.S.C. 103(a) as being unpatentable over Nakamura (JP 02-277006).

Regarding claims 6 and 8; Nakamura discloses all of the limitations of claims 6 and 8 as applied above, except for the refractive index of the lens being substantially equal to a refractive index of the core, the refractive index of the lens being greater than a refractive index of the sealing agent, and the refractive index of the sealing agent being substantially equal to the refractive index of the clad. One of ordinary skill in the art would have been motivated to have the refractive index of the lens be substantially equal to the refractive index of the core to minimize the amount of light scattered and/or lost at the interface of the core and the lens. Furthermore, the refractive index of the core of the optical fiber is greater than the refractive index of the surrounding cladding so that light may be confined to and transmitted through the core of the fiber. Therefore, to have the refractive index of the lens be substantially equal to the refractive index of the core, the refractive index of the lens must be greater than the refractive index of the cladding, which is less than the refractive index of the core. Furthermore, to ensure that the light continues to be confined to the core region of the fiber after the

cladding is removed from the core at the end of the fiber, one of ordinary skill in the art would have found it obvious to have the refractive index of the sealing material (adhesive) surrounding the core where the cladding has been removed be less than that of the core and most preferably equal to that of the cladding to maintain the light transmission properties of the optical fiber. Therefore, one of ordinary skill in the art would also have found it obvious to have the refractive index of the sealing agent be substantially equal to the refractive index of the clad, thereby having the refractive index of the lens be greater than the refractive index of the sealing agent to maintain the light transmission properties of the optical fiber, to confine light to the core of the optical fiber in the region where the sealing agent is applied and to minimize loss at the interface of the core and the lens.

Claims 12, 13, 25 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ladany (US 4,265,699).

Regarding claims 12, 13 and 25; Ladany discloses all of the limitations these claims, except for specifically stating that energy is applied to the liquid material to cure the liquid material or that ultraviolet cured resin is used to form the lens. In column 4, lines 10-15, Ladany discloses that the lens is formed from material such as a curable liquid. One of ordinary skill in the art would have been familiar with UV curable resins, as they are well known, readily available and widely used in the art. Thus, one of ordinary skill in the art would have found it obvious to use a UV curable resin that is cured by applying energy in the form of UV light to form the lens in the invention of Ladany, since UV curable resins are widely used and readily available in the art.

Regarding claim 26; Ladany teaches or suggests all of the limitations of claim 26 as applied above, except for the ultraviolet light being incident on the face of the core at one end of the optical fiber, propagating through the core, exiting from the other end of the optical fiber and irradiating the lens precursor. One of ordinary skill in the art would have found it obvious to use UV curable resin as the precursor for the lens and to irradiate the lens precursor with UV light, as discussed above. Additionally, one of ordinary skill in the art would have found it obvious to place a UV light source at one end or the other end of the optical fiber to cure the precursor, wherein the UV light would inherently pass through the optical fiber core either before or after passing through and curing the precursor.

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ladany (US 4,265,699) in view of Noel, Jr. (US 4,268,113).

Regarding claim 14; Ladany discloses all of the limitations of claim 14, except for the lens-integrated optical fiber being incorporated in an optical module comprising an optical element having an optical part and a semiconductor chip electrically connected to the optical element. Ladany teaches that the lens is formed on the optical fiber to increase the amount of light that can be coupled into the optical fiber (see column 1, lines 54-58). Optical modules comprising an optical element having an optical part, a semiconductor chip electrically connected to the optical element, and an optical fiber coupled thereto are well known and very elementary in the art. Noel, Jr. discloses an optical module comprising an optical element (10) having an optical part (24), a semiconductor chip (28) electrically connected to the optical element and an optical

fiber (20) coupled thereto for transmitting and/or receiving light from the optical part (24) of the optical element (10, see Figures 1-3). One of ordinary skill in the art would have found it obvious to either incorporate the lensed optical fiber disclosed by Ladany in the invention of Noel, Jr. in place of the optical fiber disclosed by Noel, Jr. or to form a lens on the end of the optical fiber disclosed by Noel, Jr., as taught by Ladany, in order to improve the amount of light that can be coupled between the optical part of the optical element and the optical fiber in the invention of Noel, Jr.

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ladany (US 4,265,699) in view of Murata (US 2002/0118924 A1).

Regarding claim 15; Ladany discloses all of the limitations of 15, except for the lens-integrated optical fiber being incorporated in an optical transmission apparatus, the transmission apparatus comprising a light emitting element coupled to one end face of the optical fiber, a semiconductor chip packaged with and electrically coupled to the light emitting element, a light receiving element coupled to the other end face of the optical fiber; and a semiconductor chip packaged with and electrically coupled to the light receiving element. Optical transmission devices having these features are known in the art. Ladany teaches that the lens is formed on the optical fiber to increase the amount of light that can be coupled into the optical fiber (see column 1, lines 54-58). Murata discloses an optical transmission system having a light-emitting device/element coupled to one end of an optical waveguide (optical fiber), the light-emitting device having a semiconductor chip packaged therewith and electrically coupled thereto, and a light-receiving device/element coupled to the other end of the optical waveguide (optical

fiber), the light-receiving device having a semiconductor chip packaged therewith and electrically coupled thereto (see claim 21 and Figures 6, 11, 14 and 17). One of ordinary skill in the art would have found it obvious to either incorporate the lensed optical fiber disclosed by Ladany in the invention of Murata in place of the optical fiber disclosed by Murata or to form a lens on the end of the optical fiber disclosed by Murata, as taught by Ladany, in order to improve the amount of light that can be coupled between the optical fiber and the light-transmitting and/or light-receiving devices in the invention of Murata.

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kroupenkine (US 6,674,940 B2) in view of Noel, Jr. (US 4,268,113).

Regarding claim 14; Kroupenkine discloses all of the limitations of claim 14, except for the lens-integrated optical fiber being incorporated in an optical module comprising an optical element having an optical part and a semiconductor chip electrically connected to the optical element. Kroupenkine teaches that the lens is formed on the optical fiber to increase the amount of light that can be coupled into the optical fiber from various optical devices (see column 1, lines 10-31). Optical modules comprising an optical element having an optical part, a semiconductor chip electrically connected to the optical element, and an optical fiber coupled thereto are well known and very elementary in the art. Noel, Jr. discloses an optical module comprising an optical element (10) having an optical part (24), a semiconductor chip (28) electrically connected to the optical element and an optical fiber (20) coupled thereto for transmitting and/or receiving light from the optical part (24) of the optical element (10,

see Figures 1-3). One of ordinary skill in the art would have found it obvious to either incorporate the lensed optical fiber disclosed by Kroupenkine in the invention of Noel, Jr. in place of the optical fiber disclosed by Noel, Jr. or to form a lens on the end of the optical fiber disclosed by Noel, Jr., as taught by Kroupenkine, in order to improve the amount of light that can be coupled between the optical part of the optical element and the optical fiber in the invention of Noel, Jr.

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kroupenkine (US 6,674,940 B2) in view of Murata (US 2002/0118924 A1).

Regarding claim 15; Kroupenkine discloses all of the limitations of 15, except for the lens-integrated optical fiber being incorporated in an optical transmission apparatus, the transmission apparatus comprising a light emitting element coupled to one end face of the optical fiber, a semiconductor chip packaged with and electrically coupled to the light emitting element, a light receiving element coupled to the other end face of the optical fiber; and a semiconductor chip packaged with and electrically coupled to the light receiving element. Optical transmission devices having these features are known in the art. Kroupenkine discloses teaches that the lens is formed on the optical fiber to increase the amount of light that can be coupled into the optical fiber (see column 1, lines 10-31). Murata discloses an optical transmission system having a light-emitting device/element coupled to one end of an optical waveguide (optical fiber), the light-emitting device having a semiconductor chip packaged therewith and electrically coupled thereto, and a light-receiving device/element coupled to the other end of the optical waveguide (optical fiber), the light-receiving device having a semiconductor chip

packaged therewith and electrically coupled thereto (see claim 21 and Figures 6, 11, 14 and 17). One of ordinary skill in the art would have found it obvious to either incorporate the lensed optical fiber disclosed by Kroupenkine in the invention of Murata in place of the optical fiber disclosed by Murata or to form a lens on the end of the optical fiber disclosed by Murata, as taught by Kroupenkine, in order to improve the amount of light that can be coupled between the optical fiber and the light-transmitting and/or light-receiving devices in the invention of Murata.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Timmermann (US 4,193,663); Ukrainczyk (US 6,549,704 B2); Mikolas (US 2003/0138201 A1); Khoe (EP 0 260 742); Khoe et al. (US 4,761,609); Bear et al. (US 4,338,352); Kawai et al. (JP 2002-221627); Ukrainczyk et al. (US 2003/0053751 A1); Ranguin et al. (US 2002/0131699 A1); and Hosoya et al. (JP 2000-304967) each disclose lens-integrated optical fibers.

Any inquiry concerning the merits of this communication should be directed to Examiner Michelle R. Connelly-Cushwa at telephone number (571) 272-2345. The examiner can normally be reached 9:00 AM to 7:00 PM, Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney B. Bovernick can be reached on (571) 272-2344. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Any inquiry of a general or clerical nature should be directed to the Technology Center 2800 receptionist at telephone number (571) 272-1562.

Michelle R. Connelly-Cushwa

Michelle R. Connelly-Cushwa
Patent Examiner
February 1, 2005